

in view of Shibata et al., U.S. Patent No. 5,371,373 ("Shibata"). In response, Applicants respectfully traverse these rejections.

**I. Response to Rejections under 35 U.S.C. § 103(a)**

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness for claims 1-6 and claims 7-21.

In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim elements. Furthermore, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." See M.P.E.P. § 2143.01 (8<sup>th</sup> Ed., Aug. 2001), quoting *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings. Third, there must be a reasonable expectation of success. See M.P.E.P. § 2143, pp. 2100-122 to 127.

With regard to claims 1-6, a *prima facie* case of obviousness has not been established because Murai and Watanabe, taken alone or in combination, fail to teach or suggest all the claim elements. With regard to claims 7-21, a *prima facie* case of obviousness has not been established because Murai, Watanabe and Shibata, taken alone or in combination, fail to teach or suggest all the claim elements. Each set of claims will now be addressed separately with respect to the cited prior art.

**A. Claims 1-6**

Claim 1 is directed to a charged beam exposure for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard

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cells on the substrate comprising a combination of elements including, *inter alia*, "a Character Projection (CP) aperture having shaping holes of the charged beam having shapes of the standard cells."

Murai is directed to an electron beam lithography apparatus. Murai discloses that the apparatus comprises an electron gun 21, electron lenses 23 and 24, deflection lenses 25 and 26, and first and second aperture plates 29 and 210. See Murai, Fig. 2. Murai discloses that the second aperture plate includes apertures corresponding to repetitive unit patterns. Murai, col. 4, lines 3-50. The Examiner alleged that Murai's repetitive unit patterns correspond to the standard cells as claimed and that Murai's aperture corresponds to the character projection aperture (Office Action, p. 4). Applicants, however, submit that the Examiner has misconstrued Murai.

The charged beam exposure as claimed delineates patterns to describe a system in a logic expression and converts the logic expression into a connection of standard cells, and the standard cells are expressed in shaping holes of the character projection aperture. In contrast, the apertures of Murai's second aperture plate represent repetitive patterns, not standard cells. These patterns are determined by dividing design data into random patterns and repetitive patterns. Murai, col. 4, lines 11-21 The repetitive patterns are then resized into various sizes and then formed onto aperture plate 210. Murai, Fig. 10B and col. 7, line 57 to col. 8, line 19. Thus, Murai's apertures correspond to repetitive patterns of various sizes, not standard cells associated with logic expressions. Therefore, Murai fails to teach or suggest at least a charged beam exposure for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of

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standard cells, and to delineate patterns of the standard cells on the substrate comprising, *inter alia*, "a Character Projection (CP) aperture having shaping holes of the charged beam having shapes of the standard cells."

Moreover, Watanabe fails to teach or suggest these claim elements. Watanabe is directed to a semiconductor chip having a data input/output lines and a logic circuit integrated on a single chip. Watanabe discloses the design schematic of the semiconductor chip. See Watanabe, Figs. 1 and 2. However, Watanabe does not disclose a method of forming the chip or a charge beam device which could be used to form the chip. Therefore, Watanabe fails to teach or suggest at least a charged beam exposure for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate comprising, *inter alia*, "a Character Projection (CP) aperture having shaping holes of the charged beam having shapes of the standard cells."

Thus, Murai and Watanabe, when taken alone or in combination, fail to teach or suggest all the elements of claim 1. Thus, a *prima facie* case of obviousness has not been established for claim 1. For at least this reason, claim 1 is allowable.

Claims 2-6 are allowable at least due to their dependence from allowable claim 1. "If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious." M.P.E.P. § 2143.03, p. 2100-126 *citing In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

Moreover, there is no suggestion or motivation to modify Murai or Watanabe to produce Applicants' claimed invention. Even the Examiner's characterization of the

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references still does not establish that there would have been the requisite suggestion or motivation to modify them. "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." M.P.E.P. § 2143.01, p. 2100-124, *citing In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). As mentioned above, Murai is directed to a lithography apparatus, whereas Watanabe fails to disclose any lithography apparatus or method. Because of this, their resultant combination cannot be obvious, since, for the reasons presented above, it does not produce Applicants' claimed invention.

Likewise, there cannot be any expectation of success from so doing, because combining the references still would not produce Applicants' claimed invention. One skilled in the art would only arrive at the present claimed invention by consulting Applicants' disclosure. Therefore, the only way to construct the claimed invention from the cited references would be to rely on aspects related to the present invention. Such reliance, however, would constitute improper hindsight reasoning. As Applicants have already established that the applied references cannot be modified to produce the present invention, Applicants submit that, according to the M.P.E.P., the Examiner's citation of Murai and Watanabe is not sufficient to establish *prima facie* obviousness over Applicants' claims 1-6. Similarly, without any motivation within Murai or Watanabe to modify them, there can be no reasonable expectation of success from so doing to somehow produce Applicants' present invention.

#### **B. Claims 7-21**

Claim 7 is directed to an exposure pattern data generation apparatus for delineating patterns of a system on a substrate to describe the system in a logic

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expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate comprising a combination of elements including, *inter alia*, "Character Projection (CP) aperture creation means for creating CP apertures having shaping holes corresponding to the standard cells." Claim 15 is directed to an exposure pattern data generation method for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate comprising a combination of elements including, *inter alia*, "creating Character Projection (CP) apertures having shaping holes corresponding to the standard cells."

Murai is directed to an electron beam lithography apparatus. Murai discloses that the apparatus comprises an electron gun 21, electron lenses 23 and 24, deflection lenses 25 and 26, and first and second aperture plates 29 and 210. See Murai, Fig. 2. Murai discloses that the second aperture plate includes apertures corresponding to repetitive unit patterns. Murai, col. 4, lines 3-50. The Examiner implicitly alleged that Murai's repetitive unit patterns correspond to the standard cells as claimed and that Murai's aperture corresponds to the character projection aperture. Applicants submit that the Examiner has misconstrued Murai.

The charged beam exposure apparatus and method as claimed delineates patterns to describe a system in logic expression and converts the logic expression in a connection of standard cells. In contrast, the apertures of Murai's second aperture plate represent repetitive patterns, not standard cells. Murai, col. 4, lines 11-21 The repetitive patterns are then resized into various sizes and then formed onto aperture

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plate 210. Murai, Fig. 10B and col. 7, line 57 to col. 8, line 19. Thus, Murai's apertures correspond to repetitive patterns of various sizes not standard cells associated with logic expressions. Therefore, Murai fails to teach or suggest at least an exposure pattern data generation apparatus or method as recited in claims 7 and 15, respectively.

Moreover, Watanabe fails to teach or suggest these claim elements. Watanabe is directed to a semiconductor chip having a data input/output lines and a logic circuit integrated on a single chip. Watanabe discloses the design schematic of the semiconductor chip. See Watanabe, Figs. 1 and 2. However, Watanabe does not disclose a method of forming the chip or a charge beam device which could be used to form the chip. Therefore, Watanabe fails to teach or suggest at least an exposure pattern data generation apparatus or method as recited in claims 7 and 15, respectively.

Furthermore, Shibata fails to teach or suggest these claim elements. Shibata is directed to an electron lithography method. However, as in Murai, Shibata teaches that the lithography patterns are separated according to repetitive and non-repetitive patterns, but does not disclose standard cells associated with logic expressions. See Shibata, Fig. 1. Therefore, Shibata fails to teach or suggest at least an exposure pattern data generation apparatus or method as recited in claims 7 and 15, respectively.

Thus, Murai, Watanabe, and Shibata, when taken alone or in combination, fail to teach or suggest all the elements of claims 7 and 15. Thus, a *prima facie* case of obviousness has not been established for claims 7 and 15. For at least this reason, claims 7 and 15 allowable.

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Claims 8-14 are allowable at least due to their dependence from allowable claim 7. Claims 16-21 are allowable at least due to their dependence from allowable claim 15. See M.P.E.P. § 2143.03, p. 2100-126.

Moreover, there is no suggestion or motivation to modify Murai, Watanabe, or Shibata to produce Applicants' claimed invention. Even the Examiner's characterization of the references still does not establish that there would have been the requisite suggestion or motivation to modify them. "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." M.P.E.P. § 2143.01, p. 2100-124, *citing In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). As mentioned above, Murai and Shibata are directed to a lithography apparatus, whereas Watanabe fails to disclose any lithography apparatus or method. Because of this, their resultant combination cannot be obvious, since, for the reasons presented above, it does not produce Applicants' claimed invention.

Likewise, there cannot be any expectation of success from so doing, because combining the references still would not produce Applicants' claimed invention. One skilled in the art would only arrive at the present claimed invention by consulting Applicants' disclosure. Therefore, the only way to construct the claimed invention from the cited references would be to rely on aspects related to the present invention. Such reliance, however, would constitute improper hindsight reasoning. As Applicants have already established that the applied references cannot be modified to produce the present invention, Applicants submit that, according to the M.P.E.P., the Examiner's citation of Murai, Watanabe, and Shibata is not sufficient to establish *prima facie*

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obviousness over Applicants' claims 7-21. Similarly, without any motivation within Murai, Watanabe, or Shibata to modify them, there can be no reasonable expectation of success from so doing to somehow produce Applicants' present invention.

## **II. Conclusion**

In view of the foregoing, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

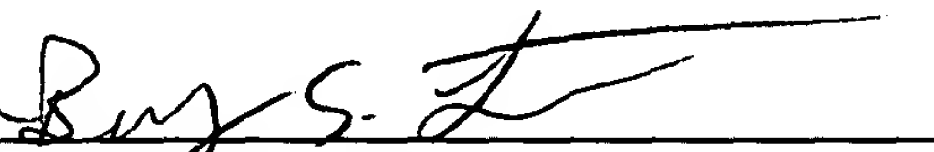
Attached hereto is a marked-up version of the changes made to the claims by this Amendment. The attachment is captioned "**Appendix to Amendment of March 12, 2003**".

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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**Appendix to Amendment of March 12, 2003**

**IN THE CLAIMS:**

Please amend claims 1, 7, and 15, as follows:

1. (Amended) A charged beam exposure for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate, comprising:

a beam generation source generating a charged beam;

a Character Projection (CP) aperture having shaping holes of the charged beam having shapes of the standard cells [used for logic design of a system];

standard cell library recording means for recording first placement positions of the shaping holes on said CP aperture;

pattern data recording means for recording second placement positions of the standard cells on the [a] substrate, the second placement positions associated with the first placement positions;

a character select deflector irradiating the charged beam onto the shaping holes at the first placement positions; and

an objective deflector irradiating the charged beam onto the second placement positions on the substrate.

7. (Amended) An exposure pattern data generation apparatus for delineating patterns of a system on a substrate to describe the system in a logic expression, to

convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate, comprising:

Character Projection (CP) aperture creation means for creating CP apertures having shaping holes corresponding to the standard cells;

Character Projection (CP) aperture decision means for conducting logic synthesis for the CP apertures using the standard cells corresponding to the shaping holes placed on first placement positions on the respective CP apertures, and for selecting the CP aperture used for exposure; and

placement and routing means for calculating second placement positions of the standard cells on the [a] substrate, the standard cells corresponding to the shaping holes provided on the selected CP aperture.

15. (Amended) An exposure pattern data generation method for delineating patterns of a system on a substrate to describe the system in a logic expression, to convert the logic expression into a connection of standard cells, and to delineate patterns of the standard cells on the substrate, comprising:

creating Character Projection (CP) apertures having shaping holes corresponding to the standard cells;

conducting logic synthesis for the Character Projection (CP) apertures using the standard cells corresponding to the shaping holes placed at first placement positions on the respective CP apertures;

selecting a CP aperture used for exposure from the CP apertures; and

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calculating second placement positions of the standard cells on the [a] substrate,  
the standard cells corresponding to the shaping holes provided on the selected CP  
aperture.

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